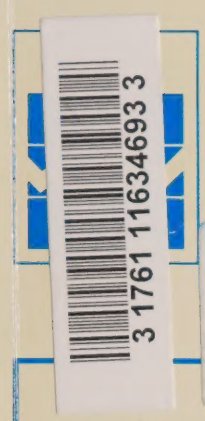

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THE DURATION OF UNEMPLOYMENT DURING BOOM AND BUST*

by

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by

Miles Corak

No. 56

Buisness and Labour Market Analysis Group
Analytical Studies Branch
Statistics Canada
1993

THE DURATION OF UNEMPLOYMENT DURING BOOM AND BUST*

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ABSTRACT

The research reported in this paper has both a substantive and a methodological objective. The main objective is to contrast developments in the average duration of unemployment in Canada during the 1990-1991 recession with developments during that of 1981-1982. In doing so a new measure of the average duration of unemployment is also introduced to the Canadian literature: the average completed duration of unemployment for a cohort of individuals that begin their spell of unemployment at the same time. Cyclical variations in this statistic are in sharp contrast with those of the average duration of unemployment that is published as a part of the *Labour Force Survey*.

The Canada-wide average duration of unemployment for those individuals becoming unemployed during the 1990-1991 recession is, at 19.6 weeks, about the same as that experienced during the 1981-1982 recession. What distinguishes the recent recession from that of a decade ago is the fact that the chances of leaving unemployment during the first two months of unemployment appear to be better, but the chances of leaving at three months and longer are worse: unemployment has become more polarized. This finding is attributed to a long-standing structural change that occurred in the aftermath of the 1981-1982 recession, and that was not reversed by the recovery and expansion of the 1980s. We note that there is a great deal of cyclical variation in the duration of unemployment in Canada. Fluctuations in the duration of unemployment account for about 65 per cent of any changes in the unemployment rate, while fluctuations in the incidence of unemployment account for the remaining 35 per cent. We also find that upswings in the business cycle disproportionately increase the probability of leaving unemployment for the shorter-term unemployed. Recovery and expansion does relatively little to improve the exit probabilities of the longer-term unemployed. The most notable development in the data is the extent of the change that has occurred in the Ontario labour market. Those permanently laid-off in Ontario have suffered a 107 per cent increase in the duration of unemployment between 1988 and 1992. This is due to a very large decline in the probability of leaving unemployment during the first month of unemployment.

KEYWORDS: Unemployment, Unemployment Duration, Hazard Rates, Business Cycle, Canada

THE DURATION OF UNEMPLOYMENT DURING BOOM AND BUST

While there are many indicators of the severity of recessions, the unemployment rate must surely rank as one of the most closely watched. In large part this is because it has an obvious and direct relationship to individual welfare. However, the aggregate unemployment rate is determined by both changes in the rate at which individuals become unemployed (the incidence of unemployment), and the length of time they stay unemployed (the duration of unemployment). It might reasonably be argued that it is not so much the fact of becoming unemployed that impacts upon an individual's well-being, but rather the duration of time spent unemployed. If this is the case then the change in the unemployment rate during a business cycle is not a clear indicator of the impact of recession and recovery on individual and societal welfare, and an analysis of the duration of unemployment is required.

Further, increases in the duration of unemployment are sometimes cited as explaining "persistence" in the aggregate unemployment rate. It has often been noted that the unemployment rate displays an asymmetric dynamic over the course of the business cycle: rising sharply during the onset of recessions, but declining only sluggishly during recovery and expansion. For example, at the onset of the 1981-1982 recession the average annual unemployment rate stood at 7.5 per cent, but within a year it rose sharply to 11.0 per cent, and only returned to its pre-recession level in 1989, after 7 years of strong growth. It has also been noted that increases in the incidence of unemployment are responsible for the sharp rise in the unemployment rate during the onset of recessions, but that increases in duration are largely responsible for its very slow decline during recovery and expansion. Thus, to understand the persistence in the unemployment rate, we need to understand changes in the average length of time individuals spend unemployed.

For these reasons this paper addresses the duration of unemployment spells. The main objective of our research is to examine cyclical movements in the duration of unemployment with a particular emphasis on a comparison of developments during the 1981-1982 recession with those of 1990-1991. However, we also have a methodological

objective: to introduce a new measure of the average duration of unemployment to the Canadian literature. The analysis is based upon the average completed duration of a spell of unemployment for a cohort of newly unemployed individuals.

The cyclical movement of the average duration of unemployment, as we have defined it, contrasts sharply with that regularly published as a part of the *Labour Force Survey* (LFS). The first section of the paper highlights and explains these differences, and reviews some important developments. In particular we note that while the country-wide average duration of unemployment does change counter-cyclically, the experience of those individuals becoming unemployed during the 1990-1991 recession is not that different from those becoming unemployed during the 1981-1982 recession. We also note, however, that unemployment is becoming more polarized: the shorter-term unemployed (those unemployed for less than three months) seem to have fared relatively better during the latest recession than they did a decade ago, but the longer-term unemployed (those unemployed for three months or longer) have fared worse.

There are also some notable differences when disaggregated data are examined. We review these in the second section of the paper. In particular we find that the Ontario labour market has undergone very dramatic changes: the average duration of unemployment for those permanently laid-off has increased by more than 100 per cent in Ontario during the recession of the early 1990s, but only by 25 per cent in the rest of Canada. This is in sharp contrast with the 1981-1982 experience, which did not display significant inter-regional differences. There are also important differences between the unemployed according to age. Older unemployed individuals have suffered much longer unemployment spells in the recent recession, while younger individuals have experienced substantially shorter durations.

In the third section of the paper we examine the cyclical relationship between the unemployment rate and the average duration of unemployment in more detail. In particular we examine the exit rate, that is the conditional probability of leaving unemployment, and its variation over time. We find that economic downturns lower the exit rate from unemployment for both the shorter-term unemployed and the longer-term unemployed, but that recovery and expansion disproportionately favour the former group. During periods of growth individuals appear to be hired off the unemployment queue according to a "first in - first out" rule.

I. A CANADA-WIDE OVERVIEW

It is not a straightforward matter to define the average duration of an unemployment spell, but the starting point for most any discussion is the statistic that is published by the LFS. This is the average duration of in-progress spells of unemployment from a sample of individuals unemployed during the survey week. It is the average *interrupted* duration of unemployment for the *currently* unemployed. The LFS does not capture the completed length of an unemployment spell, only the length of time up to the reference week. The spell may continue for some time afterwards, or it may end the next day. The average duration of unemployment that is produced is the sum of all of these interrupted spell lengths divided by the number of unemployed.[1] We do not employ it in our analysis because it does not measure the completed length of unemployment, and because it refers to the current stock of unemployed individuals. This latter point is particularly important because it implies that developments in this statistic are influenced not only by the current inflows to unemployment, but also by all past inflows.

The measure we employ is the *average expected completed duration of unemployment for a cohort of individuals that begin their spell of unemployment at the same time*. It is a measure of completed spell length, and captures the environment that individuals currently becoming unemployed are expected to face. In what follows we refer to it as simply the average completed duration. The relationship between each of the measures and the Canada-wide unemployment rate is depicted in Figures 1 and 2. The two measures display different levels throughout the 1977 - 1992 period, with the LFS measure being longer. Too much should not be made of the difference in levels for at least two reasons. First, the LFS is a biased measure of completed spell length. It is not clear what one can learn from comparing a measure of interrupted spell lengths to a measure of completed lengths without a more detailed analysis.[2] Second, the derivation of the average

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1 For the most part the LFS classifies survey respondents as unemployed if they are without work and looking for work. Those individuals that are classified as being on temporary lay-off are not required to fulfill the job-search requirement in order to be considered unemployed. In this case the duration of unemployment is given as the number of weeks since the lay-off began. Furthermore, individuals may be deemed unemployed in the LFS without fulfilling the search requirement if they have found a job and expect to start at some definite date in the future. The duration of unemployment will be recorded for these "future starts" only if they also happen to be searching for work. Further, it should be noted that a spell of unemployment may end in two ways: individuals may become employed, or they may leave the labour force. See Statistics Canada (1992).

2 The average interrupted duration of unemployment is a biased measure of the average completed duration not only because it measures incomplete spells, but also because of a sampling bias in which long

completed duration for a cohort requires certain assumptions to be made with regard to how the data are smoothed. These smoothing assumptions, which are discussed in the appendix, do not influence the cyclicality of the statistic, but they do have an important influence on its level.

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insert figures 1 and 2

The LFS average duration, which is depicted in Figure 1, displays a broad counter-clockwise loop. This, for the most part, is due to the fact that this statistic is associated with the stock of unemployed. During a sharp change in the unemployment rate the average interrupted duration is prone not to change very much. For example, during the onset of a recession there are large inflows into unemployment with the result that the stock of unemployed becomes more heavily weighted with individuals that have just begun a spell of unemployment. While these individuals will ultimately go on to experience long spells of unemployment, only the length of unemployment up to the time of the survey is used in the derivation of the average spell length. Thus, between 1981 and 1982 as the economy entered into recession the unemployment rate shot up by 3 1/2 percentage points, but the average LFS duration increased by about only 1 week. Similarly with the coming of the 1990-1991 recession the unemployment rate increased, but between 1989 and 1990 the average duration actually fell. The pattern is just the opposite during recovery and expansion: inflows to unemployment fall, and the stock of unemployment becomes more heavily weighted with individuals who are in the midst of rather long spells of unemployment, spells that began during the recession and that reflect the state of the economy during that period. Thus, as the 1981-1982 recession ended and as recovery took hold in 1983, the unemployment rate rose by less than 1 percentage point, but the average duration increased by about 5 weeks. Between 1983 and 1985 the expansion was well under way, the unemployment rate fell 1 1/2 percentage points, but there was no change in the average duration of unemployment. In this way the counter-clockwise loops observed in the data reflect the stock nature of the measure. At any point in time the LFS measure does not capture the current state of the labour market.

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spells are over-sampled. Salant (1977) discusses these two biases, and formally examines the relationship between the average interrupted and average completed spell statistics. He also provides a theorem that suggests that if the exit rates decline with time spent unemployed the average interrupted duration will be greater than the average completed duration. This is the case in our data.

In contrast, the cyclical variation in the average expected completed duration of unemployment, which is presented in Figure 2, is stable throughout the period. There is a loop in the data, but it is a very muted clockwise movement. In contrast to the LFS measure, the turning points in the movement of this statistic correspond to peaks and troughs in labour market conditions. Average spell duration peaks at the same time as the unemployment rate, declines during recovery and expansion, and increases immediately with the onset of recession. Further, the change during the 1990-1991 recession appears to follow roughly the same path as during the 1981-1982 recession. According to this statistic the situation faced by those becoming unemployed during 1990-1991 recession is not much different on average than that faced by those becoming unemployed a decade earlier. During 1983 the average completed duration of unemployed was 19.5 weeks; during 1992 it was 19.6 weeks.

Complete tabulations of the average completed duration and the details of its derivation are provided in the appendix. The *exit rate* is among the concepts discussed in the appendix. This rate is central to the derivation of the average completed duration of unemployment. It is defined as the probability of leaving unemployment conditional on the elapsed time in unemployment: that is, given that an individual has been unemployed for say t months the exit rate refers to the probability that he or she will leave unemployment during the next month. It is possible to obtain greater insights into developments in the average completed duration of unemployment by examining the exit rate.

Table 1 presents the exit rate, as well as the completed duration of unemployment, for selected years, those corresponding to highs and lows in the aggregate unemployment rate. Consider the data for 1992, which represent an annual average of the monthly figures. The data should be interpreted in the following way: given that an individual has become unemployed, the probability of leaving before completing one full month of unemployment is 33 per cent; given that an individual has been unemployed for at least one month, the probability of leaving before completing two months is 27 per cent; and so on. During 1992, the probability of leaving unemployment falls with the length of time already spent unemployed. This pattern holds for most years, and has been well established in the academic literature.[3]

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3 There is an exception to this pattern between the 2nd and 3rd months of unemployment during the early 1980s. The exit rate rises between these months, and then declines with each successive month. Section III discusses the developments in the exit rates in more detail, and notes that the ranking of the rates at the 2nd and 3rd months is reversed after 1983.

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insert table 1

The differences in the exit rates between 1992 and 1983 are of particular interest. These are years in which the unemployment rate reached its post-recession peaks. As noted the average completed duration is about the same, but the exit rates reveal a significant difference in the structure of unemployment. The probability of leaving unemployment is higher for the shorter-term unemployed during 1992 than during 1983, but lower for the longer-term unemployed. Figure 3 illustrates this fact more clearly by presenting the percentage difference in the exit rates between the two years. The exit rate at two months is more than 20 per cent higher in 1992 than it was in 1983, but the rate during 7 to 12 months, for example, is more than 10 per cent lower. In other words, there is evidence of greater polarization in the structure of unemployment duration during the recession of the early 1990s than there was during that of the early 1980s. The chances of leaving unemployment are greater during the first, and especially the second month of unemployment, but much lower during later months. This implies that although the average spell duration was about the same during the two recessions, the distribution is more heavily skewed towards longer duration during the 1990-1991 recession. It also implies that there is a tendency for the number of long-term unemployed in the total stock of unemployed to increase.

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insert figure 3

II. SOME SECTORAL DEVELOPMENTS

Table 2 presents the average expected duration of unemployment for a variety of subgroups, and for a selected number of years. Once again, the full tabulations are provided in the appendix. In general, the differences between 1983 and 1992 are not profound, but there are some significant differences for certain sub-groups. Those unemployed in Ontario appear on average to fare worse in 1992 than in 1983, as do those 45 years and older. Job leavers, those permanently laid-off in regions outside of Ontario, and the young actually experienced unemployment spells that were on average about 2 to 3 weeks shorter during 1992 than during 1983.

The most notable development highlighted in Table 2 is the extent of the change in the Ontario labour market between 1989 and 1992: the average duration of unemployment increased overall by 9 weeks, and by more than 13 weeks for those permanently laid-off. While the average duration is almost 4 weeks longer than that experienced during the 1981-1982 recession, the transition from expansion to recession was much more dramatic. This is clearly evident in Figure 4, which charts the average expected duration for those permanently laid-off in Ontario and in the rest of Canada. There is little difference in the measures before the 1981-1982 recession. Between 1981 and 1982 the average duration for those permanently laid-off in Ontario increased by 62 per cent, declined sharply between 1983 and 1984, and continued to do so until 1988. It has increased in every year since: rising 107 per cent from 14 weeks in 1988 to 29 weeks in 1992. In the rest of Canada the average duration for those permanently laid off increased by 36 per cent between 1980 and 1982, but by only 25 per cent between 1988 and 1991, before declining in 1992.

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insert table 2 and figure 4

Figure 5 depicts the developments in the exit rates for those permanently laid-off in Ontario. Like the Canada wide results discussed earlier, the 1992 exit rate is higher than that of 1983 during the first 2 to 3 months of unemployment (although lower during the first month), but lower during longer months. The exit rates for the boom years also display this pattern, but the major development depicted in Figure 5 is the extent of the change in the exit rates between the expansion of the late 1980s and the recession that followed. During 1989 the exit rate out of unemployment during the first month was 41 per cent, but had fallen to only 17 per cent by 1992. This is the most dramatic change in the data, and is in sharp contrast with what happened during the recession of the early 1980s. Between 1980 and 1982 there was very little change in the exit rate at 1 month, in fact it was slightly higher during the recessionary year than during the boom. The major change occurred during the second and third months of unemployment. To underscore this point, if 100 individuals were laid off in Ontario during 1989 about 41 would have left unemployment within one month, in 1992 only 17 would have done so.

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insert figure 5

Figure 6 presents the time series of average expected duration by age: 15 to 24 years, 25 to 44 years, and 45 years and older. There are both trend and cyclical developments in these data. The 25 to 44 year old group has experienced an upward trend in average duration, while the 15 to 24 year group has faced a downward trend. The percentage increase in average duration during the two recessions is slightly lower for the young (37 per cent between 1980 and 1983 versus 35 per cent between 1989 and 1991); also slightly lower for the 25 to 44 year olds (37 per cent between 1980 and 1983, but only 34 per cent between 1988 and 1992); but much greater for the oldest age group (31 per cent between 1980 and 1983, but 43 per cent between 1990 and 1992). In particular, those 45 years of age and older experienced much longer unemployment spells in 1992 than in 1983 (26.2 weeks versus 22.8 weeks); those 25 to 44 years of age about the same (21 weeks); while the young, those 15 to 24 years of age, experienced significantly shorter spells (14.8 weeks in 1992 versus 17.7 in 1983).

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insert figure 6

III. CYCLICAL VARIATIONS IN AVERAGE DURATION

The considerable differences in the average duration of some of the subgroups outlined in Table 2 is suggestive of one possible explanation for the cyclical variation in the aggregate average duration: the country-wide average duration of unemployment may increase during a recession because the inflows into unemployment become more heavily weighted with groups that have longer than average unemployment spells. We examine this possibility in this section, but it should first be noted that the cyclical variation in average duration is indeed significant. In fact it would appear that the duration of unemployment, rather than the incidence, is the major factor determining the changes in the unemployment rate.

As Figure 2 indicates the average completed duration of unemployment displays counter-cyclical variation. A Least Squares regression reveals that the elasticity of average duration with respect to the unemployment rate is 0.64. That is, a 10 per cent change in the unemployment rate implies about a 6 1/2 per cent change in the average spell

duration.[4] This suggests that the duration of unemployment is the major contributor to changes in the unemployment rate: about 65 per cent of a steady-state change in the unemployment rate is due to longer duration and 35 per cent to higher inflows.[5]

Cyclical movements in the duration of unemployment may in fact occur for two reasons. As mentioned, the average duration of unemployment may rise during recession because the composition of the inflow to unemployment becomes more heavily weighted with individuals that normally have long duration. However, it may also rise because the exit rates determining the duration for all groups decline.

We examine these possibilities by constructing two series of simulated average duration of unemployment spells. The details of the derivation are provided in the appendix. The exit rates that determine the average spell duration for Canada as a whole can be expressed as weighted sums of the exit rates of the underlying sub-populations. The weights are the share that each subgroup represents of the total number unemployed for a given length of time. The first simulated statistic is constructed by holding the weights constant at their annual average for 1983, and permitting the subgroup exit rates to take their actual values; the second permits the weights to vary, but holds the exit rates constant at, once again, the 1983 annual average. If cyclical movements in the actual average duration of unemployment are due to compositional changes then the probability constant measure should track the actual average duration more closely than the weights constant measure. On the other hand the opposite should be the case if changes in continuation rates are the cause of cyclical movements in the average duration.

Figure 7 presents the results for the sub-grouping by age. The constant-probabilities statistics increases gradually from 19.3 weeks at the beginning of the period

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4 The least squares estimation results, using a sample of 199 monthly observations dating from June 1976 to December 1992, are ln(AVGDUR) = -0.149 + 0.642 ln(UR), R^2=0.882, DW=1.41, where AVGDUR is the Canada-wide average expected completed duration of unemployment, and UR is the Canada-wide unemployment rate (not seasonally adjusted). The t-statistic associated with the ln(UR) coefficient is 20.3. The model also includes a set of monthly indicator variables to control for seasonality, and a linear time trend. Alternative specifications (without a time trend, with a quadratic time trend, and with corrections for an AR(1) error structure) led to slightly larger estimates for the coefficient on ln(UR). These ranged from 0.649 in a model with only seasonal indicators and no AR(1) adjustment to 0.695 in a model with a quadratic time trend adjusted for AR(1) errors.

5 This follows from the fact that in a steady state the unemployment rate is the product of incidence and average duration, or equivalently that the logarithm of the unemployment rate is the sum of the logarithms of incidence and average duration.

to 20.2 weeks at the end, and displays no cyclical variability at all. In contrast the weights-constant measure tracks the actual statistic relatively closely. While it appears to be longer than the actual measure before 1983, and shorter afterwards, it displays the same cyclical dynamics. In fact, the age sub-groupings display the widest discrepancy between the actual and weights-constant measures: the weights constant statistic calculated for breakdowns by region, gender, reason for unemployment, and education are all closer to the actual duration. Thus, an understanding of cyclical variations in the duration of unemployment requires an understanding of the variations in the underlying exit rates.

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insert figure 7

For this reason we examine the exit rates more closely in Figure 8, which presents each of the six exit rates for Canada by year. The recession of the 1980s caused large declines in all of the exit rates, but the subsequent recovery and expansion did not return them all to pre-recession levels. Only the exit rates associated with the 1st, 2nd, and 7th to 12th months display a cyclical pattern: declining during the recession, rising during recovery and expansion, and then declining with the last recession. The exit rate at 2 months is the only one to surpass the levels it attained before the 1981-1982 recession. The relative position of the exit rates for the 2nd and 3rd months actually changes. The chances of leaving unemployment during the 3rd month were higher than that during the 2nd month before 1984. The change in ranking resulted from a sharp increase in the exit rate at 2 months during the expansion of the 1980s combined with a minimal change in the 3 month exit. In fact, the exit rates associated not only with the 3rd month, but also that of the 7th to 12th months, and the 13th to 24th months did not return to pre-recession levels during the expansion and recovery. Thus, the increased polarization in the duration structure of unemployment between the two recessions should be attributed to structural changes that are coincident with the 1981-1982 recession. While the 1981-82 recession caused a decline in all exit rates, the subsequent upturn only improved the rates at the shorter durations. This suggests that individuals are hired off the unemployment queue according to a "first in - first out" rule.

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insert figure 8

To emphasize this point table 3 presents the results of least squares regressions of the natural logarithm of each of the exit rates against the natural logarithm of the unemployment rate. The entries in the table should therefore be interpreted as elasticities:

the percentage change in the dependent variable for a one percentage point change in the aggregate unemployment rate. The elasticity between the average duration and the unemployment rate that was alluded to earlier is also presented. The elasticity between the exit rates and the unemployment rates falls with the length of time unemployed. During the first two months of unemployment a one per cent change in the unemployment rate corresponds to a 0.25 per cent change in the exit rate. There is a sharp decline in this figure to 0.15 at three months and longer, and then another sharp drop (to 0.06) for those unemployed more than a year. In other words economic expansion tends to favour those who have just begun a spell of unemployment over those that have already spent a considerable length of time unemployed.

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insert table 3

IV. CONCLUSIONS

This paper has introduced a new measure of the average duration of unemployment to the analysis of Canadian data - the average expected completed duration of unemployment for a cohort of newly unemployed individuals - and examined its cyclical variability. The major conclusions are as follows.

First, as an indicator of the cyclical state of the labour market, the average duration statistic that has been used is a valuable complement to the statistic that is currently released as a part of the LFS. The fact that the latter measures incomplete spell length makes it difficult to interpret, while the fact that it relates to the stock of currently unemployed individuals implies that it captures and is influenced by developments in the past not just current developments. As a result cyclical variations in the LFS statistic do not solely reflect *current* labour market developments. In the future analysts that wish to describe the cyclical variation in the duration of unemployment spells may find the statistic that we have introduced to be of value.

Second, the average duration of unemployment for those individuals becoming unemployed during the 1990-1991 recession is, at 19.6 weeks, about the same as that experienced during the 1981-1982 recession in spite of the fact that the national unemployment rate is slightly lower. Further, the relationship between this measure and the unemployment rate has not changed over time. The path followed by the average

duration as expansion turned to recession from 1989 to 1992 was the same as that followed from 1980 to 1983.

Third, there are significant differences in the average duration of unemployment for some sub-groups. Older unemployed individuals have fared considerably worse; younger individuals better. This reflects a trend evident since the late 1970s. Those individuals permanently laid-off in Ontario have been subject to particularly severe cyclical increases in the duration of unemployment. While their experience vis à vis 1981-1982 is not all that different, the extent of the change from business cycle peak to trough has been particularly sharp and severe. This change is due, in some significant degree, to an extremely large fall of the exit rate during the first month of unemployment.

Fourth, cyclical variations in the country-wide average duration of unemployment are significant. The elasticity of average spell duration with respect to the unemployment rate is about 0.65. This suggests that changes in the duration of unemployment are the major determinants in cyclical variations of the Canadian unemployment rate.

Fifth, the observed cyclical variations in the average duration of unemployment are not, on the other hand, to be explained by changes in the composition of the inflows, but rather by the changes in the underlying exit rates. Broad-based explanations that influence all sectors of the economy are called for, not sector specific shocks.

Sixth, and finally, in spite of the fact that the average duration of unemployment is no different between the 1981-1982 and 1990-1991 recessions, the distribution of unemployment is more skewed to longer duration during the latter. The exit rates during the early 1990s display more polarization than during the early 1980s: they are higher at durations of one and two months, but lower at durations of three months and longer. This difference can be traced to structural changes that are coincident with the 1981-1982 recession. The recession of 1981-1982 caused a sharp fall in the exit rates at all durations, but the recovery and expansion caused only the rates at shorter durations to return to pre-recession levels. While recession seems to reduce the probability of leaving unemployment for all of the unemployed, recovery and expansion tends to favour the shorter-term unemployed more than it does the longer-term unemployed. This is the underlying reason for the increase in the fraction of long-term unemployed that first becomes apparent in the aftermath of the 1981-82 recession, and continues into the more recent recession.

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Table 1
Monthly Exit Rates of Leaving Unemployment,
Canada, Selected Years

Month of Unemployment	1980	1983	1989	1992
1st month	0.39	0.33	0.41	0.33
2nd month	0.32	0.22	0.33	0.27
3rd month	0.34	0.28	0.30	0.26
4th to 6th month	0.27	0.21	0.22	0.20
7th to 12th month	0.20	0.16	0.21	0.14
13th to 24th month	0.13	0.09	0.10	0.08
Average Duration (weeks)	14.1	19.5	14.8	19.6

Table 2
Average Expected Duration of Unemployment,
Selected Years
(weeks)

	1980	1983	1989	1992
Canada	14.1	19.5	14.8	19.6
Ontario	14.0	18.4	12.5	21.6
Rest of Canada	14.3	20.2	15.8	18.6
Ontario, Permanent Layoffs	20.0	25.5	15.7	29.0
Rest of Canada, Permanent Layoffs	18.3	24.9	18.4	22.6
Job Leavers	16.4	26.1	18.0	24.4
Labour Force Entrants	12.5	16.9	12.4	16.8
Job Losers	14.7	20.0	15.1	20.3
Permanent Layoffs*	18.4	24.9	17.6	24.3
Males	14.8	20.8	15.2	20.6
Females	13.4	18.0	14.3	18.4
15 to 24 Years	12.9	17.7	11.3	14.8
25 to 44 Years	14.8	20.8	16.5	21.1
45 + Years	17.4	22.8	19.2	26.2
Primary Education Only	16.3	20.2	18.2	20.4
Some Secondary or Secondary Graduation	13.7	19.7	14.6	19.0
Some Post-Secondary, or Post-Secondary Graduation	13.9	18.9	14.5	20.4

* Permanent Layoffs refers to all Job Losers that are not temporarily laid-off.

Table 3
Cyclical Elasticities,
Least Squares Regression Results

ln (Exit Rate)	*ln* (UR)	R^2	D.W.
1st month	-0.251	0.84	1.68
2nd month	-0.244	0.84	1.88
3rd month	-0.146	0.71	1.96
4th to 6th month	-0.147	0.85	1.10
7th to 12th month	-0.157	0.75	0.78
13th to 24th month	-0.061	0.60	0.73
Average Duration	0.642	0.88	1.41

APPENDIX

We follow the work of Sider (1985) and Baker (1992a) in using a synthetic cohort approach to the derivation of the average spell duration of a cohort of unemployed individuals. In contrast to the earlier literature this methodology yields a statistic that does not rely upon a steady state assumption.

Let $S_i(x,t)$ represent the conditional probability that an individual belonging to group i will stay unemployed at least to the xth month given that the individual has been unemployed for $x-1$ months. $S_i(x,t)$ can be estimated from a sample of type i individuals as $N_i(x,t)/N_i(x-1,t-1)$, where $N_i(x,t)$ represents the number of individuals unemployed at least x months, but less than $x+1$ months in month t. That is, the probability of surviving to the xth month of unemployment is simply the ratio of the number of individuals reporting to be unemployed x months during period t to the number of individuals that reported being unemployed $x-1$ months during period $t-1$. We refer to $S_i(x,t)$ as the continuation rate, and $H_i(x,t) = 1-S_i(x,t)$ as the exit rate, the conditional probability of leaving unemployment before month x, given unemployment of $x-1$ months. The former is calculated from LFS data on the reported number of weeks of unemployment, that is of continuous job search.

Limitations of sample size require us to calculate continuation rates for six progressively broader intervals: one month, two months, three months, four to six months, seven months to one year, and greater than one year. Specifically the continuation rates are calculated as the ratios of the number of individuals in each of the following categories:

5-8 weeks in month t to < 5 weeks in month t-1
9-12 weeks in month t to 5-8 weeks in month t-1
13-16 weeks in month t to 9-12 weeks in month t-1
27-39 weeks in month t to 13-26 weeks in month t-3
53-78 weeks in month t to 27-52 weeks in month t-6
99 + weeks in month t to 53-98 weeks in month t-12.

The LFS data are top coded at 99 weeks. Except for a slight difference in the last ratio these are the same categories used by Baker (1992a: 315). The fourth, fifth, and sixth continuation rates are converted to monthly equivalents by raising them respectively to the 1/3, 1/6, and 1/12 powers. This assumes that the monthly continuation rates are constant within the interval. These monthly rates are used in the derivation of the average duration. This is done for the entire LFS sample and by various subgroups. The expected average duration of a spell of unemployment for a group of individuals that begin their spell at time t is given as:

$$\begin{aligned} D_i(t) = \; & 1 + S_i(1,t) \\ & + S_i(1,t)S_i(2,t) \\ & + S_i(1,t)S_i(2,t)S_i(3,t) \\ & + S_i(1,t)S_i(2,t)S_i(3,t)S_i(4,t) \\ & + S_i(1,t)S_i(2,t)S_i(3,t)S_i(4,t)S_i(5,t) \\ & + \ldots \end{aligned}$$

In effect, each term in this equation is an estimate of a point on the survivor function. The summation is the discrete time version of the result that in continuous time the average duration is given as the integral of the survivor function.[6] This statistic should be interpreted as the expected average duration of unemployment for a cohort of individuals that becomes unemployed at time t, and faces current economic conditions throughout the length of their unemployment spells.

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[6] If x indexes the duration of unemployment and is distributed with density function $f(x)$, then the average duration of unemployment is $\int x f(x)\, dx$. Integrating by parts, and using the definition of the Survivor function, $G(x)$, as 1 minus the cumulative distribution function yields $\int G(x)dx$. See Sider(1985: 461-64) for the discrete time derivation and its relationship to estimators that rely upon steady-state assumptions.

The LFS requires unemployed survey respondents to report the duration of their unemployment spells in weeks. We use the monthly survey results from 1977 through to 1992. Reliable information on the duration of unemployment exists for part of 1976, and from 1977 onward. The frequency distribution for the entire sample is presented in Figure A-1. This figure reveals significant spikes in the data at 2, and especially 4 week intervals. In reporting the length of their unemployment spells survey respondents seem to prefer even numbers to odd, and months to part-months. This "digit preference" has been noted by many observers. Sider (1985), working with U.S. Current Population Survey data suggests that the data be smoothed before average duration is calculated, and Baker (1992b) explores implications of various smoothing assumptions. Since broad intervals are being used in the derivation of average duration, smoothing need only occur for those weeks on the interval boundaries. Some fraction of individuals reporting a spell length that coincides with the interval boundaries need to be reallocated to the next interval. Sider reallocates 50 per cent, and Baker (1992a) reallocates 30 per cent, 40 per cent, and 50 per cent at progressively longer intervals. Baker (1992b) finds that the choices made are important in determining the level the duration statistic, but not its cyclical variability. We have examined the influence of alternative smoothing assumptions, and reach the same conclusion. For the sake of comparability with the most recent study we follow Baker's algorithm by reallocating to the next interval 30 per cent of those respondents reporting 4, 8, 12, 24, 26 and 40 weeks of unemployment, 40 per cent of those reporting 52 weeks, and 50 per cent of those in the 99 week category.

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insert figure A-1

The continuation rates that determine the average spell duration for Canada as a whole can be expressed as weighted sums of the continuation rates of the underlying sub-populations. The weights are the share that each subgroup represents in the duration interval of interest. If $i = 1...k$ indexes the subgroups then $S(x,t) = N(x,t)/N(x-1,t-1)$ can also be expressed as $\sum_i \{N_i(x-1,t-1)/N(x-1,t-1)\}\ S_i(x,t)$. We follow Baker (1992: 319) in using this relationship to derive the simulated average duration statistics presented in Figure 7.

Table A-1
Average Expected Completed Duration of Unemployment, and Monthly Continuation Rates: Canada 1977-1992

Year	Average Duration (weeks)	Monthly Continuation Rates					
		1st month	2nd month	3rd month	4 to 6 months	7 to 12 months	13 to 24 months
1977	15.5	0.655	0.726	0.678	0.732	0.789	0.861
1978	15.3	0.657	0.716	0.675	0.728	0.787	0.870
1979	13.6	0.602	0.703	0.649	0.714	0.773	0.849
1980	14.1	0.614	0.682	0.658	0.728	0.793	0.867
1981	14.3	0.591	0.705	0.668	0.737	0.796	0.882
1982	18.9	0.670	0.776	0.717	0.788	0.846	0.902
1983	19.5	0.672	0.779	0.724	0.786	0.838	0.910
1984	17.2	0.650	0.715	0.723	0.785	0.822	0.888
1985	16.7	0.636	0.710	0.728	0.769	0.813	0.903
1986	15.6	0.612	0.702	0.697	0.775	0.803	0.897
1987	15.4	0.618	0.680	0.697	0.766	0.788	0.915
1988	14.3	0.591	0.658	0.736	0.745	0.793	0.888
1989	14.8	0.593	0.671	0.697	0.774	0.787	0.902
1990	15.4	0.618	0.675	0.728	0.767	0.795	0.897
1991	18.4	0.663	0.726	0.738	0.786	0.836	0.919
1992	19.6	0.669	0.730	0.739	0.802	0.858	0.916

Table A-2
Average Expected Completed Duration of Unemployment by Region:
1977-1992
(weeks)

Year	Canada	Ontario	Rest of Canada	Permanent Lay-offs		
				Canada	Ontario	Rest of Canada
1977	15.5	15.0	15.6	20.7	19.9	21.2
1978	15.3	15.0	15.4	19.1	18.7	19.3
1979	13.6	13.3	13.8	16.7	16.4	17.0
1980	14.1	14.0	14.3	18.4	20.0	18.3
1981	14.3	13.4	14.8	18.3	16.8	19.1
1982	18.9	18.5	19.2	25.3	27.0	24.9
1983	19.5	18.4	20.2	24.9	25.5	24.9
1984	17.2	15.8	18.0	20.7	19.2	21.4
1985	16.7	14.8	17.7	19.6	17.5	20.5
1986	15.6	13.9	16.4	18.7	17.0	19.3
1987	15.4	13.2	16.4	17.8	15.3	18.8
1988	14.3	11.7	15.6	17.0	14.0	18.1
1989	14.8	12.5	15.8	17.6	15.7	18.4
1990	15.4	14.5	15.9	19.3	19.5	19.2
1991	18.4	19.7	18.0	23.8	26.9	22.5
1992	19.6	21.6	18.6	24.3	29.0	22.6

Table A-3
Average Expected Completed Duration of Unemployment,
By Reason for Unemployment: 1977-1992
(weeks)

Year	Job Leavers	Labour Force Entrants	Job Losers	Permanent Layoffs
1977	18.9	13.2	16.4	20.7
1978	18.7	13.4	15.6	19.1
1979	15.7	12.3	14.0	16.7
1980	16.4	12.5	14.7	18.4
1981	16.4	12.4	15.0	18.3
1982	24.6	16.6	19.5	25.3
1983	26.1	16.9	20.0	24.9
1984	22.7	14.8	17.7	20.7
1985	21.4	14.1	17.0	19.6
1986	19.8	12.6	16.4	18.7
1987	19.4	13.4	15.5	17.8
1988	19.3	12.0	14.5	17.0
1989	18.0	12.4	15.1	17.6
1990	18.4	13.0	16.1	19.3
1991	24.0	14.4	19.3	23.8
1992	24.4	16.8	20.3	24.3

Table A-4
Average Expected Completed Duration of Unemployment,
By Gender and Age: 1977-1992
(weeks)

Year	Males	Females	15 to 24 Years	25 to 44 Years	45 + Years
1977	16.0	14.9	14.6	15.8	18.7
1978	15.6	14.9	13.9	16.1	18.2
1979	14.0	13.2	12.5	14.4	16.4
1980	14.8	13.4	12.9	14.8	17.4
1981	15.5	13.1	13.0	15.2	17.6
1982	20.6	17.0	17.5	19.8	21.9
1983	20.8	18.0	17.7	20.8	22.8
1984	18.2	16.1	14.5	19.0	21.3
1985	18.0	15.3	14.0	18.0	21.7
1986	16.5	14.5	13.1	16.7	20.6
1987	15.6	15.2	12.6	17.0	19.2
1988	14.9	13.8	11.7	15.7	18.0
1989	15.2	14.3	11.3	16.5	19.2
1990	16.2	14.5	12.4	16.9	18.3
1991	19.8	17.0	15.3	19.7	22.8
1992	20.6	18.3	14.8	21.1	26.2

Table A-5
Average Expected Completed Duration of Unemployment,
By Educational Attainment: 1977-1992
(weeks)

Year	Primary Only	Some Secondary or Secondary Graduation	Some Post-Secondary or Post-Secondary Graduation
1977	17.8	15.4	14.3
1978	16.8	14.9	15.2
1979	15.6	13.4	13.2
1980	16.3	13.7	13.9
1981	16.8	13.9	13.8
1982	19.2	18.7	19.7
1983	20.2	19.7	18.9
1984	18.6	16.9	17.6
1985	18.4	16.7	16.1
1986	16.9	15.7	14.9
1987	18.7	15.2	14.8
1988	16.4	14.0	14.4
1989	18.2	14.6	14.5
1990	17.0	14.5	17.3
1991	20.8	18.0	18.4
1992	20.4	19.0	20.4

Figure 1
Average Interrupted Duration of Unemployment
Canada, 1977-1992

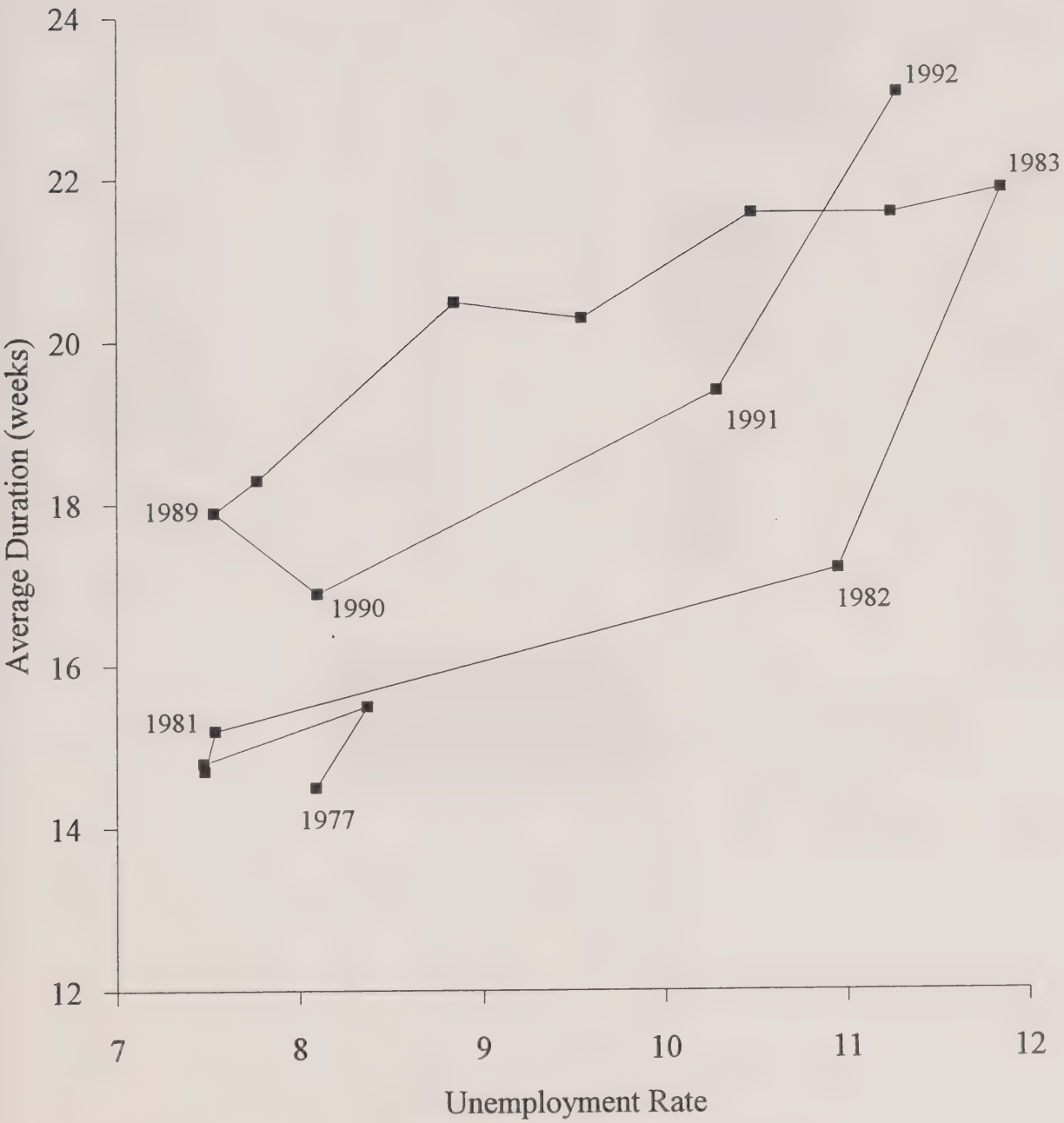


Figure 2
Average Completed Duration of Unemployment
Canada, 1977-1992

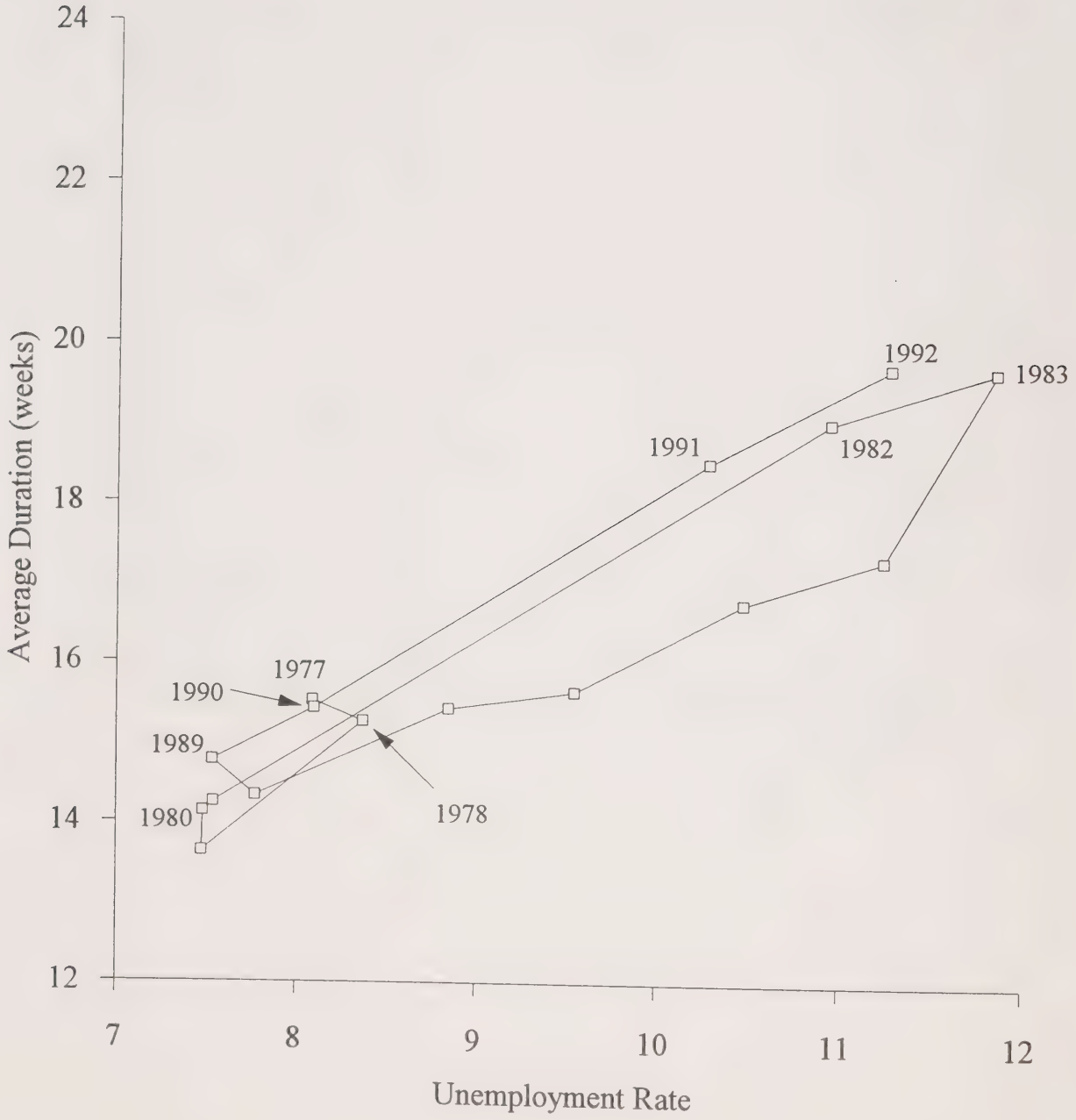


Figure 3
Percentage Change in Exit Rates:
Canada, 1983-1992

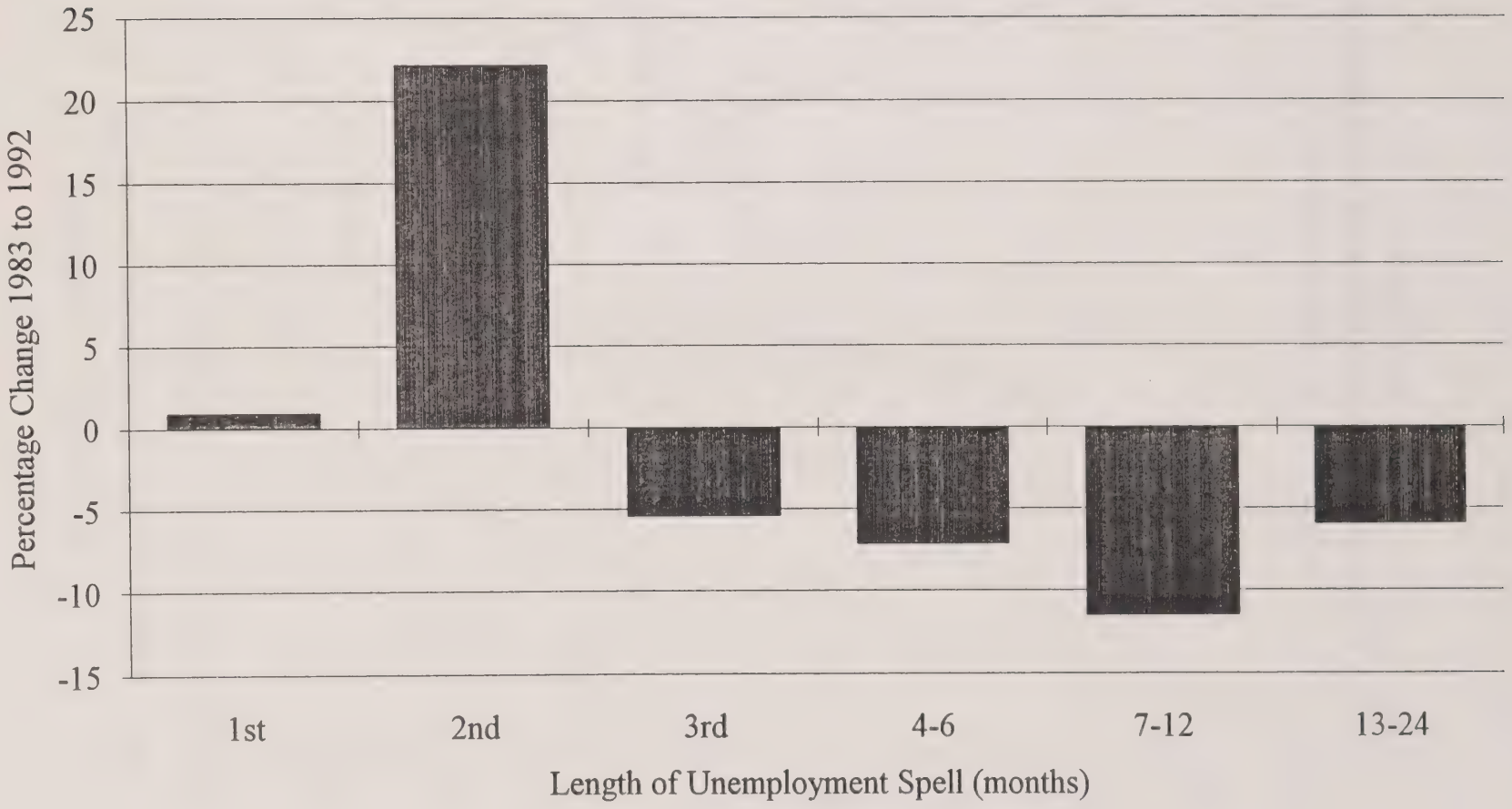


Figure 4
Average Completed Duration of Unemployment
Permanent Lay-offs by Region, 1977-1992

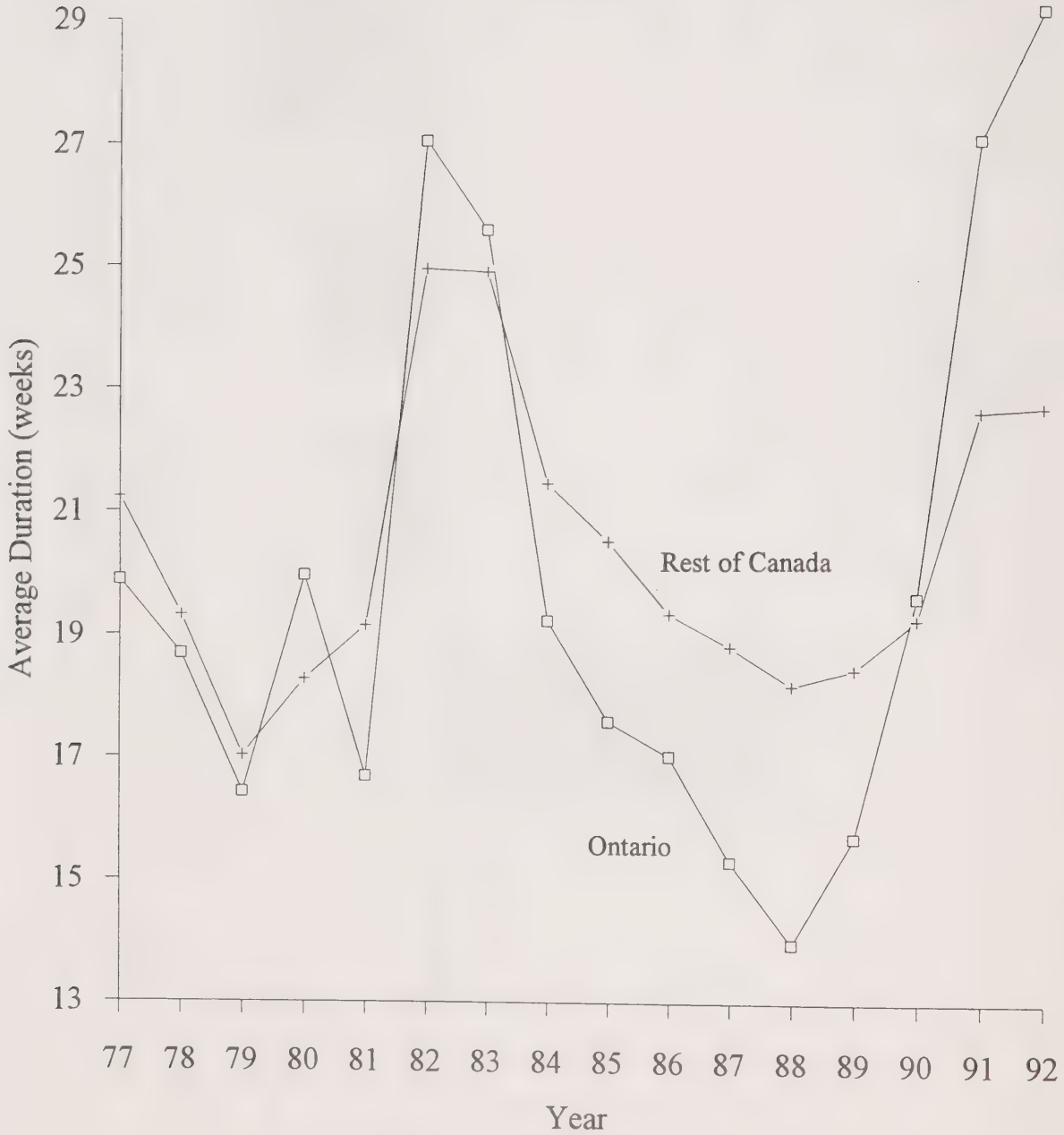


Figure 5
Exit Rates from Unemployment: Ontario Permanent Lay-offs

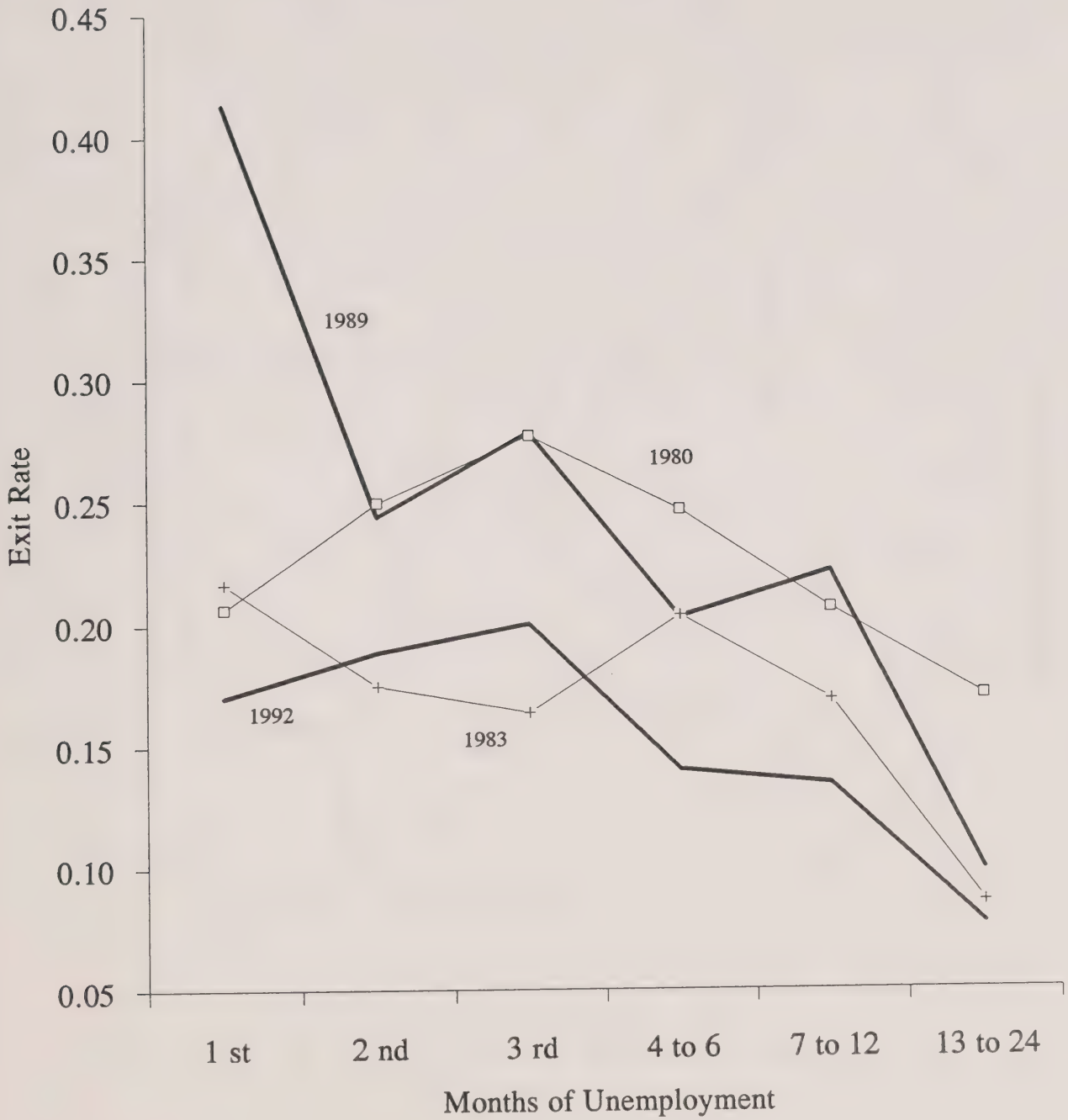


Figure 6
Average Completed Duration of Unemployment
By Age, 1977-1992

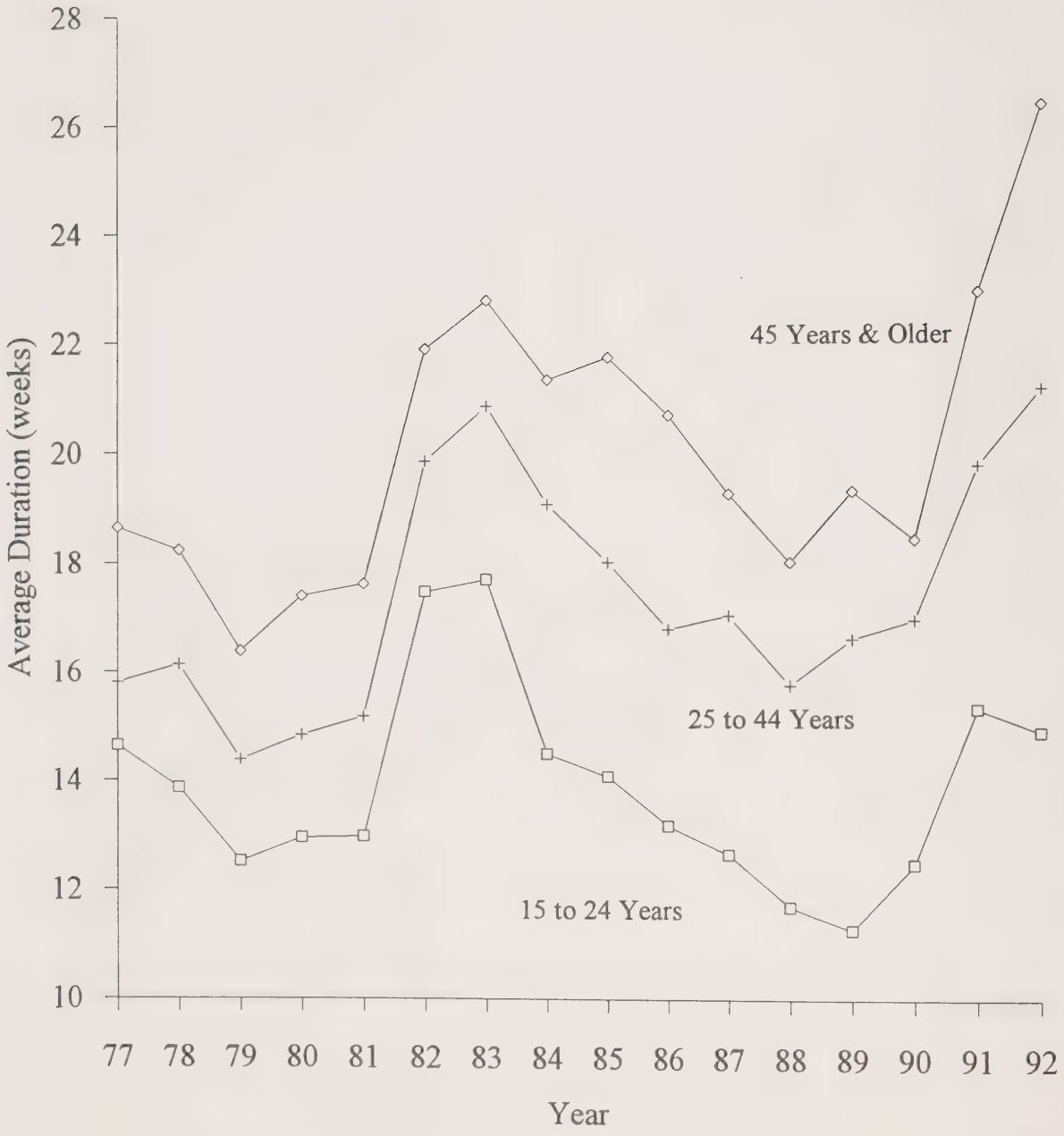


Figure 7
Average Duration of Unemployment by Year,
Actual and Simulated: Age Subgroups

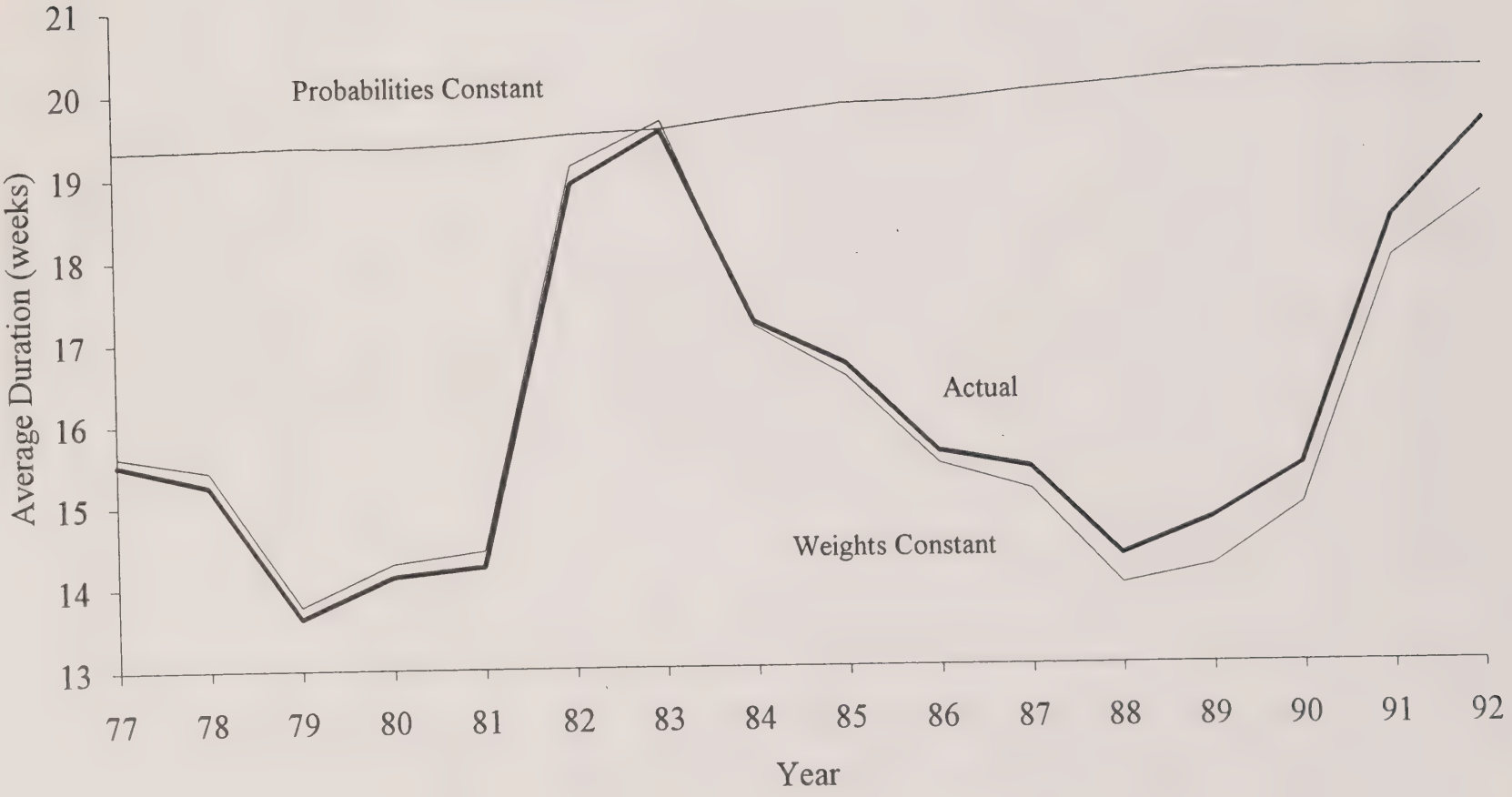


Figure 8
Exit Rates from Unemployment: Canada, 1977-1992

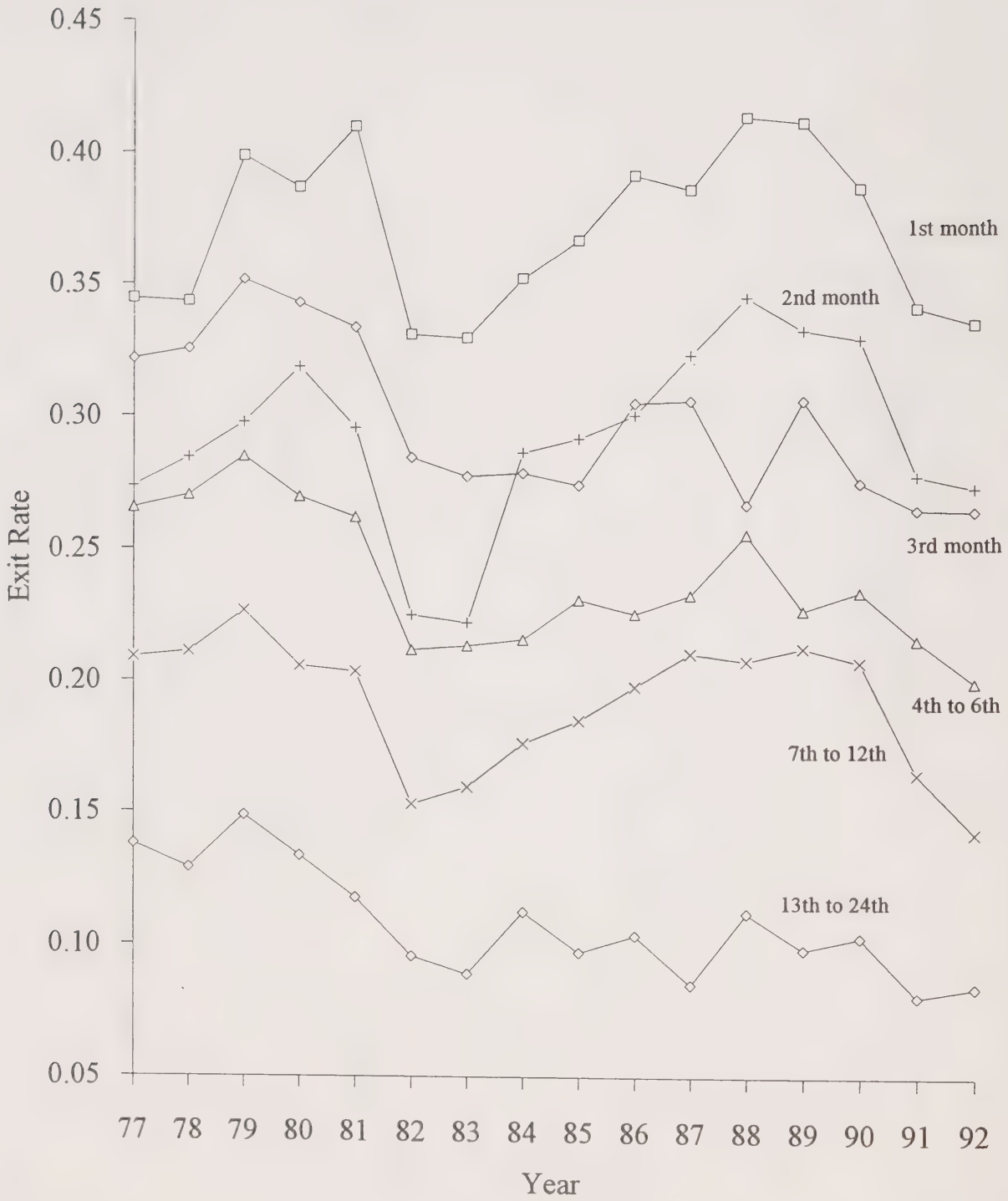
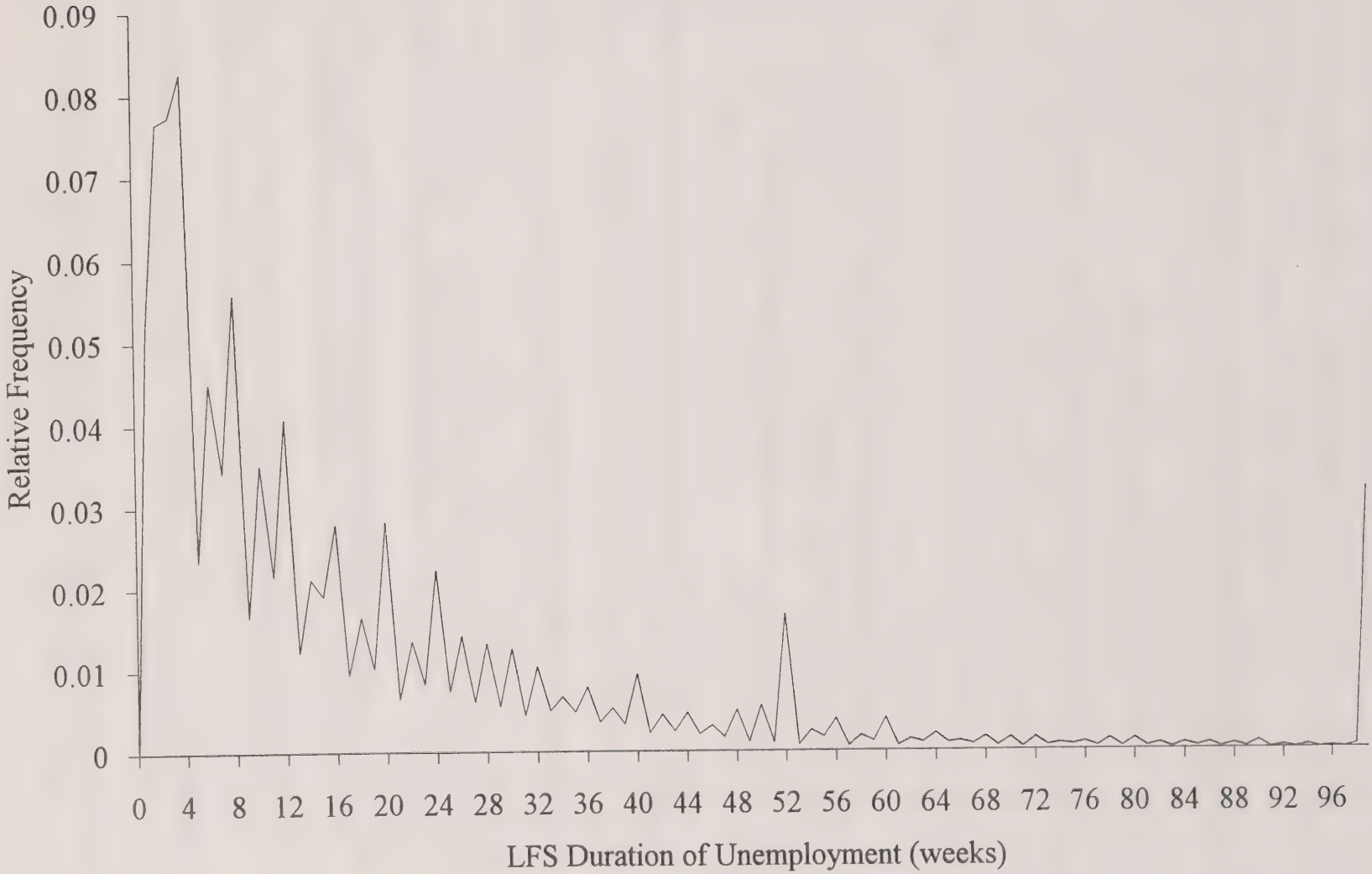


Figure A-1
Sample Frequency Distribution, LFS Duration
Canada, 1977-1992



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